

## Notes on the Phonetic Diversity of Complex Vocalic Nuclei in the Atlantic States

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It seems clear that within any speech community, several variations are generally found on all levels of linguistic structure—phonological, syntactic and lexical. Such variations can be studied along three synchronic dimensions—geographical, social and stylistic. Particularly, some of the diversities are correlated with geographical location: there are systematic differences, for instance, between the pronunciation of Michigan and that of New England, and even within some regions of New England there are differences. This type of variation has occupied the attention of dialectologists. Furthermore, there are many types of English used in particular circumstances, as evidence of social dimension, and these would be incorrect if used in other environments. These types of English are called 'registers' and many of them are associated with trades, professions or games. When we study the pronunciation of American English, we find that its dialects differ little in phonemic structure but exhibit rather marked differences in the phonetic character of the vowel phonemes. Especially, the differences are apparent in the complex vocalic nuclei.

Since the start of the Linguistic Atlas Project, with Hans Kurath as a director, in 1930, American dialectologists and linguists have accumulated excellent evidence on the regional and social variations in the United States, and many books and papers on them have been published. Among them H. Kurath and I. R. McDavid, Jr. (1961)<sup>1)</sup>, whose description of the chief regional types of cultivated speech in the Atlantic States is based upon

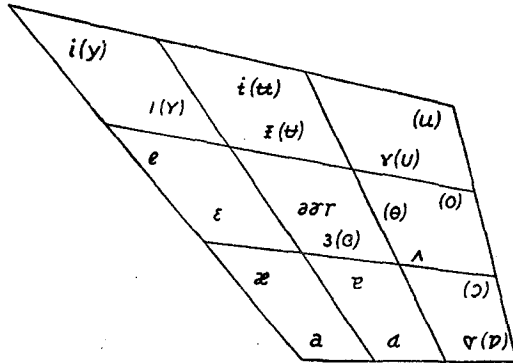
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1) *The Pronunciation of English in the Atlantic States*. The Univ. of Michigan Press, Ann Arbor, Michigan.

field records of one hundred and fifty-seven speakers in one hundred and thirty-six different communities, has been very useful to students of American English. Although this book reveals the differences in pronunciation ignored by ordinary dictionaries published in the United States and serves as a useful reference on the regional variations of pronunciation in the Atlantic States, the 'Synopsis' of it shows only the variations for each of sixty-six words in the seventy regions on diagrams as shown one of the examples on the next page<sup>2)</sup>.

- 2) H. Kurath and I. R. McDavid, Jr. (1961) *op. cit.*, p. 31. The transcription used in the book and this paper is based on a graded phonetic alphabet, which is described in full detail in Hans Kurath, Bernard Bloch, *et al.*, (1939, 2nd edition 1973) *Handbook of the Linguistic Geography of New England*. The American Council of Learned Societies, New York. pp. 122-146.

The vowel symbols are presented in the following diagrammatic arrangement. Symbols shown in parentheses in the diagram denote vowels with the acoustic effect of lip-roundings (usually produced by actual rounding of protrusion of the lips but sometimes by other means). In this paper the lip-rounding sound of ə is transcribed



by  $\beta$  instead of  $\beta$  due to the lack of printing type.

In order to avoid the necessity of using special symbols for the innumerable shades of sound intermediate between any two of the vowels shown in the diagram, shift signs are provided in the form of small arrowheads, which are placed after a vowel symbol to indicate varieties heard as articulated in a higher, a lower, a more advanced or more retracted position than the vowel denoted by the unmodified letter. An arrowhead pointing *to the left* indicates, after a front-vowel symbol, a vowel articulated exceptionally far forward; after a central-vowel symbol, a fronted vowel (one approximating front position); after a back-vowel symbol, a centered vowel (one approximating central position). An arrowhead pointing *to the right* indicates, after a front-vowel symbol, a centered vowel (one approximating central position); after a central-vowel symbol, a backed vowel (one approximating back position); after a back-vowel symbol, a vowel articulated exceptionally far back. An arrowhead

	i	ɪ	e	ɛ	ɜ	æ	ɑ	ɒ	ai	oi	au	ɔ	ɔ̃	ʌ	ə	o	u	u		
three	i <sup>v</sup>																			
grease	i <sup>v</sup>																	U <sup>w</sup>	two	
six		i																U <sup>w</sup>	tooth	
crib		i <sup>p</sup>															U		wood	
ear	i <sup>v</sup>																	U <sup>ɔ̃</sup>	pull	
beard	i <sup>ɔ̃</sup>																	U <sup>ɔ̃</sup>	poor	
eight			ɛ <sup>j</sup>															U <sup>ɔ̃</sup>	ago	
April			ɛi <sup>ɔ̃</sup>															U <sup>ɔ̃</sup>	coat	
ten				ɛ <sup>ɔ̃</sup>											U <sup>ɔ̃</sup>			U <sup>ɔ̃</sup>	road	
egg				ɛ											U <sup>ɔ̃</sup>			U <sup>ɔ̃</sup>	home	
head				ɛ											U <sup>ɔ̃</sup>			U <sup>ɔ̃</sup>	know	
Mary			ɛi												U <sup>ɔ̃</sup>			U <sup>ɔ̃</sup>	four	
stairs						æ <sup>ɔ̃</sup>									U <sup>ɔ̃</sup>			U <sup>ɔ̃</sup>	door	
care						æ <sup>ɔ̃</sup>									U <sup>ɔ̃</sup>			U <sup>ɔ̃</sup>	hoarse	
merry				ɛ											U <sup>ɔ̃</sup>			U <sup>ɔ̃</sup>	mourn	
thirty					ɜ <sup>ɔ̃</sup>									ʌ <sup>v</sup>					sun	
sermon					ɜ <sup>ɔ̃</sup>									ʌ <sup>v</sup>					brush	
furrow					ɜ <sup>ɔ̃</sup>															
ashes						æ <sup>v</sup>						v <sup>ɔ̃</sup>							frost	
bag						æ <sup>ɔ̃</sup>						v							log	
married						æ						v <sup>v</sup>							dog	
half						ɑ <sup>v</sup>						v <sup>v</sup>							water	
glass						ɑ <sup>v</sup>						v <sup>v</sup>							daughter	
aunt						ɑ <sup>v</sup>						v <sup>v</sup>							law	
father						ɑ <sup>v</sup>						v <sup>v</sup>								
palm						ɑ <sup>v</sup>						v <sup>v</sup>								
barn						ɑ <sup>v</sup>						v <sup>ɔ̃</sup>							forty	
garden						ɑ <sup>ɔ̃</sup>						v <sup>v</sup>							morning	
crop												v <sup>ɔ̃</sup>							corn	
John												v <sup>ɔ̃</sup>							horse	
college												v								
borrow												v								
five									ai		au								down	
twice									ɛi		ɑ <sup>v</sup>								out	
wire									ɔ̃i		ɑ <sup>v</sup>								flower	
									ɔ̃i										joint	
									ɔ̃i										boil	
	i	ɪ	e	ɛ	ɜ	æ	ɑ	ɒ	ai	oi	au	ɔ	ɔ̃	ʌ	ə	o	u	u		

The purpose of this paper is to deal with the the phonetic variations of the complex vocalic nuclei /ay/ as in *five* and *twice* and /ow/ as in *home* and *know* in the Atlantic States and to examine the combinations of the simple vocalic nuclei and the following glides, in addition to their distribution which are not indicated systematically in the book mentioned above.

We excerpt from all the seventy diagrams of the 'Synopses'<sup>3)</sup> the thirty-six different types of phonetic variation of /ay/ in *five*, twenty-two different pronunciations of /ay/ in *twice*, twenty-seven variations of /ow/ in *home*, and twenty-two of /ow/ in *know* which were current in 1930s and 1940s in the Atlantic States. Every variation and its distribution is as follows:

I. The variants of /ay/ in *five*

1. [a̠ ɪ] Noblefore, Me.; Billerica, Mass.; Plymouth, Mass.; Newport, R. I.; Middletown, Conn.; Poughkeepsie, N. Y.; Brooklyn, N. Y.; Williamsport, Pa.; Brookville, Pa.
2. [a̠ ɪ̠] Binghamton, N. Y.; Manhattan, N. Y.; Harrisburg, Pa.; Pittsburgh, Pa.; Wheeling, W. Va.; Farmington, W. Va.
3. [a̠ ɛ] New Haven, Conn.; Manhattan, N. Y.; Wicomico Church, Va.
4. [a̠ ɛ̠] New Bern, N. C.
5. [a̠ ɛ̠̠] Asheville, N. C.; Petersburg, Va.; Lynchburg, Va.
6. [a̠ ə] Greenville, S. C.
7. [a̠ ə<] Richmond, Va.; Edenton, N. C.
8. [a̠ ə>] Alexandria, Va.
9. [a̠̠ ɪ] New London, Conn.; Providence, R. I.; Portland, Me.; Reading, Pa.
10. [a̠̠ ɪ] Northampton, Mass.

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pointing *up* indicates a vowel articulated in a higher and usually also in a somewhat more advanced position. An arrowhead pointing *down* indicates a vowel articulated in a lower and usually also in a somewhat more retracted position. Very short vowels heard as mere glides without forming the peak of a syllable are written with superior letters.

3) H. Kurath and I. R. McDavid, Jr. (1961) *op. cit.*, pp. 31-100.

11. [a<sup>></sup> I] Concord, N. H. ; Jersey City, N. J. ; Augusta, Ga.
12. [a<sup>></sup> ε] Charleston, W. Va. ; Annapolis, Md. ; Georgetown, D. C. ;  
Norfolk, Va. ; Wilmington, N. C. ; Fayetteville, N. C.
13. [a<sup>></sup> ε<sup>></sup>] Charlotte, N. C.
14. [a<sup>></sup> ə] Lexington, Va. ; Raleigh, N. C.
15. [a<sup>></sup> ə] Newberry, S. C.
16. [a<sup>></sup> ε] Roanoke, Va. ; Columbia, S. C. ; Savannah, Ga.
17. [a<sub>λ</sub><sup>></sup> I] Fort Edward, N. Y. ; Cassville, Pa.
18. [a<sub>λ</sub><sup>></sup> I] Utica, N. Y.
19. [a<sub>λ</sub><sup>></sup> ə] Atlanta, Ga.
20. [ɑ I] Litchfield, Conn.
21. [ɑ ε] Springfield, Mass. ; Pittsfield, Mass. ; Burlington, Vt.
22. [ɑ ε<sup>></sup>] Baltimore, Md.
23. [ɑ e] Deerfield, Mass.
24. [ɑ<sup>·</sup> I] Charleston, S. C. ; Bearfort, S. C.
25. [ɑ<sup>·</sup> ε] Boston, Mass. ; Winchester, Va.
26. [ɑ<sup>·</sup> ε<sup>^</sup>] Philadelphia, Pa.
27. [ɑ<sup>·</sup> ε] Fredericksburg, Va.
28. [ɑ<sup><</sup> I] Albany, S. C.
29. [ɑ<sup><</sup> I] Charleston, S. C.
30. [ɑ<sup><</sup> ε] Baltimore, Md.
31. [ɑ<sup><</sup> ε] Richmond, Va.
32. [ɑ<sup>></sup> I] Georgetown, S. C.
33. [ɑ<sup>^</sup> I] Rochester, N. Y.
34. [ə<sup>v</sup> I] Buffalo, N. Y.
35. [e<sup>·</sup> I] Greenville, S. C.
36. [a<sup>·</sup> ε] Petersburg, Va. ; Lynchburg, Va.

II. The variants of /ay/ in *twice*

1. [e<sup>^</sup> I] Nobleboro, Me. ; Winchester, Va. ; Wincomico, Va. ; Fayetteville, N. C. ; Georgetown, S. C. ; Augusta, Ga. ; Savannah, Ga.
2. [a<sup>></sup> I] Concord, N. H. ; Providence, R. I. ; Charleston, W. Va. ; Atlanta, Ga.

3. [a ɪ] Billerica, Mass.; Plymouth, Mass.; Newport, R. I.; New London, Conn.; Litchfield, Conn.; Poughkeepsie, N. Y.; Manhattan, N. Y.; Brooklyn, N. Y.; Jersey City, N. J.; Philadelphia, Pa.; Harrisburg, Pa.; Reading, Pa.; Williamsport, Pa.; Brookville, Pa.; Pittsburgh, Pa.; Wheeling, W. Va.; Farmington, W. Va.; Roanoke, Va.
4. [ɑ̃ ɪ] Boston, Mass.
5. [ɑ̃ e] Springfield, Mass.
6. [ɑ̃ I] Northampton, Mass.
7. [ɛ I] Deerfield, Mass.
8. [a I] Middletown, Conn.
9. [a ε] New Haven, Conn.
10. [ɑ̃ ε] Pittsfield, Mass.; Burlington, Vt.
11. [ɑ̃^ ɪ] Albany, N. Y.; Baltimore, Md.; Rochester, N. Y.
12. [ã^ ɪ] Fort Edward, N. Y.; Utica, N. Y.; Binghamton, N. Y.; Cassville, Pa.; Georgetown, D. C.
13. [ə I] Buffalo, N. Y.
14. [ɑ̃^ I] Baltimore, Md.
15. [ɛ ɪ] Annapolis, Md.; Alexandria, Va.; Fredericksburg, Va.; Richmond, Va.; Petersburg, Va.; Norfolk, Va.; Lexington, Va.; Lynchburg, Va.; Wilmington, N. C.; Charleston, S. C.; Columbia, S. C.
16. [aː ɪ] Edenton, N. C.
17. [ã^ ε̃^] New Bern, N. C.
18. [a ɪv] Charlotte, N. C.
19. [ã^ ε̃^] Asheville, N. C.
20. [əv ɪ] Beaufort, S. C.
21. [ɑ ɪ] New Berry, S. C.
22. [ɛv ɪ] Greenville, S. C.

### III. The variants of /ow/ in *home*

1. [õ^ṽ] Nobleboro, Me.

2. [o<] Portland, Me.
3. [ø<sup>v</sup>] Concord, N. Y.
4. [o<̂] Billerica, Mass.
5. [β<sup>λ</sup>̂ u] Boston, Mass.
6. [o<sup>v</sup> u] Plymouth, Mass.; Deerfield, Mass.; Poughkeepsie, N. Y.; Fort Edward, N. Y.; Manhattan, N. Y.; Williamsport, Pa.; Winchester, Va.; Wicomico Church, Va.; Lexington, Va.; Charlotte, N. C.; Asheville, N. C.
7. [o u] Newport, R. I.; New London, Conn.; Springfield, Mass.; New Haven, Conn.; Pittsfield, Mass.; Albany, N. Y.; Charleston, W. Va.; Norfolk, Va.; Roanoke, Va.; Raleigh, N. C.
8. [o'] Providence, R. I.; Reading, Pa.; Fredericksburg, Va.
9. [o u] Northampton, Mass.; Middletown, Conn.; Alexandria, Va.; Petersburg, Va.; Lynchburg, Va.; Alexandria, Va.
10. [o] Litchfield, Conn.; Charleston, S. C.
11. [o<̂ u] Burlington, Vt.; Binghamton, N. Y.; Brookville, Pa.; Annapolis, Md.; Fayetteville, N. C.
12. [o' u] Utica, N. Y.
13. [β<sup>λ</sup>̂ u] Rochester, N. Y.
14. [o<sup>v</sup> u] Buffalo, N. Y.
15. [β u<sup>^</sup>] Manhattan, N. Y.
16. [o< u] Brooklyn, N. Y.; Jersey City, N. J.; Cassville, Pa.; Farmington, W. Va.; Wilmington, N. C.
17. [θ> u<sup>^</sup>] Philadelphia, Pa.
18. [o< u] Harrisburg, Pa.; Greenville, S. C.
19. [β> u] Pittsburgh, Pa.; Wheeling, W. Va.
20. [o<] Baltimore, Md.; Richmond, Va.; New Bern, N. C.
21. [θ u<] Baltimore, Md.
22. [o<̂ u] Georgetown, D. C.
23. [o< u<sup>^</sup>] Edenton, N. C.
24. [o<̂ ə] Georgetown, S. C.; Charleston, S. C.; Beaufort, S. C.; Savannah, Ga.

25. [o<sup>λ</sup>] Columbia, S. C.
26. [o<sup><</sup> u] Newberry, S. C.
27. [o<sup><</sup> u<sup><</sup>] Augusta, Ga.; Atlanta, Ga.

IV. The variants of /ow/ in *know*

1. [o<sup>v</sup> u] Nobleboro, Me.; Billerica, Mass.; Pittsfield, Mass., Norfolk, Va.; Asheville, N. C.
2. [o<sup>∇</sup> u] Boston, Mass.; Fort Edward, N. Y.; Rochester, N. Y.; Manhattan, N. Y.; Williamsport, Pa.; Cassville, Pa.; Winchester, Va.; Roanoke, Va.
3. [o<sup>u</sup>] Plymouth, Mass.; Northampton, Mass.; Albany, N. Y.; Utica, N. Y.; Baltimore, Md.; Alexandria, Va.; Richmond, Va.; Lynchburg, Va.; Raleigh, N. C.
4. [o u] Newport, R. I.; New London, Conn.; Providence, R. I.; Springfield, Mass.; New Haven, Conn.; Burlington, Vt.; Poughkeepsie, N. Y.; Binghamton, N. Y.; Jersey City, N. J.; Charleston, W. Va.; Wicomico Church, Va.; Richmond, Va.; Lexington, Va.; Fayetteville, N. C.
5. [o<sup>v</sup> u] Deerfield, Mass.
6. [o] Middletown, Conn.; Litchfield, Conn.; Reading, Pa.; Charleston, S. C.
7. [β<sup>></sup> u<sup>^</sup>] Manhattan, N. Y.
8. [β<sup>^</sup> u] Brooklyn, N. Y.
9. [o<sup><</sup> u] Philadelphia, Pa.; Farmington, W. Va.; Annapolis, Md.; Edenton, N. Y.; Wilmington, N. C.; Greenville, S. C.
10. [β<sup>λ</sup> u] Brookville, Pa.
11. [β u] Pittsburgh, Pa.
12. [ɔ<sup>∇</sup> u] Wheeling, W. Va.
13. [o<sup><</sup> u<sup>∇</sup>] Baltimore, Md.
14. [o<sup>∇</sup> u] Georgetown, D. C.
15. [o<sup><</sup> u] Petersburg, Va.
16. [o<sup>v</sup> u<sup>^</sup>] New Bern, N. C.



17. [o<sup>λ</sup> u] Charlotte, N. C.
18. [o<sup>λ</sup>] Charleston, S. C.; Beaufort, S. C.
19. [o<sup><</sup> u] Newberry, S. C.; Atlanta, Ga.
20. [o<sup>></sup> u] Savannah, Ga.
21. [o<sup><</sup>] Augusta, Ga.

From the above data, we can deduce the following facts:

- A. 1. There are fourteen types of variable pronunciation of the first unit (simple vocalic nucleus) of /ay/ as in *five*: [a, a', a<sup>></sup>, a<sup>></sup>, a<sup>λ</sup>, a<sup>λ</sup>, a, a', a<sup><</sup>, a<sup><</sup>, a<sup>></sup>, a<sup>λ</sup>, ə<sup>v</sup>, e'] and thirteen types in *twice*: [a, a', a<sup>></sup>, a<sup>></sup>, a<sup>λ</sup>, a, a<sup>λ</sup>, a<sup><</sup>, a<sup>λ</sup>, ə, ə<sup>v</sup>, e, e<sup>v</sup>].
2. There are thirteen different types of variable pronunciation of the second unit (glide) of /ay/ as in *five*: [I, I, e, ε, ε<sup>λ</sup>, ε<sup>></sup>, ε<sup>λ</sup>, ε<sup>Δ</sup>, ε, ə, ə, ə<sup><</sup>, ə<sup>></sup>] and there are seven types of glides of /ay/ in *twice*: [I, I, I<sup>v</sup>, I, ε, ε<sup>λ</sup>, ε<sup>></sup>].
- B. The simple vocalic nucleus /a/ as in *five* and *twice* has variable phonetic character as follows:
  1. Both *five* and *twice* have eight common vowels: [a, a', a<sup>></sup>, a<sup>></sup>, a<sup>λ</sup>, a, a<sup><</sup>, ə<sup>v</sup>].
  2. /a/ in *five* has six vowels which are not in *twice*: [a<sup>λ</sup>, a', a<sup>></sup>, a<sup>></sup>, e, e<sup>v</sup>].
  3. /a/ in *twice* has five vowels which are not in *five*: [a<sup>λ</sup>, a<sup>λ</sup>, ə, e, e<sup>v</sup>].
- C. The glide /y/ in *five* and *twice* has variable phonetic character as follows:
  1. Both *five* and *twice* have four common variables: [I, I, ε, ε<sup>λ</sup>].
  2. /y/ in *five* has nine variables which are not in *twice*: [e, ε<sup>λ</sup>, ε<sup>></sup>, ε<sup>Δ</sup>, ε, ə, ə, ə<sup><</sup>, ə<sup>></sup>].
  3. /y/ in *twice* has three variables which are not in *five*: [I<sup>v</sup>, I, ε<sup>λ</sup>].
- D. 1. There are eighteen variables of the simple vocalic nucleus of /ow/ in *home*: [o, o', o<sup><</sup>, o<sup><</sup>, o<sup>v</sup>, o<sup>v</sup>, ə<sup>v</sup>, o<sup>v</sup>, o<sup>λ</sup>, o<sup>λ</sup>, o<sup>v</sup>, ə, θ, θ, β, β<sup>></sup>, β<sup>λ</sup>, β<sup>Δ</sup>] and twelve variants in *know*: [o, o<sup><</sup>, o<sup><</sup>, o<sup>v</sup>, o<sup>λ</sup>, o<sup>v</sup>, ə<sup>v</sup>, ə<sup>λ</sup>, β, β<sup>></sup>, β<sup>λ</sup>, β<sup>Δ</sup>].

2. There are six different types of variables of the glide of /ow/ in *home*: [u, u<sup>^</sup>, u<sup>˘</sup>, u, u<sup><</sup>, ə] and four types glide of /ow/ in *know*: [u, u<sup>^</sup>, u<sup>˘</sup>, u<sup>˘</sup>].
3. The simple vocalic nucleus /o/ in *home* and *know* has the following phonetic character:
  - (1) Both *home* and *know* have ten common vowels: [o, o<sup><</sup>, o<sup><</sup>, o<sup>v</sup>, o<sup>˘</sup>, o<sup>˘</sup>, o<sup>˘</sup>, β, β<sup>></sup>, β<sup>˘</sup>].
  - (2) /o/ in *home* has eight variables which are not in *know*: [o<sup>˘</sup>, o<sup>v</sup>, ə<sup>v</sup>, o<sup>˘</sup>, ə<sup><</sup>, θ, θ<sup>></sup>, β<sup>˘</sup>].
  - (3) /o/ in *know* has three variants which are not in *home*: [o<sup>˘</sup>, ə<sup>˘</sup>, β<sup>^</sup>].
4. The glide /w/ in *home* and *know* has following phonetic character:
  - (1) Both *home* and *know* have the common variables: [u, u<sup>^</sup>, u<sup>˘</sup>].
  - (2) /w/ in *home* has three variables which are not in *know*: [u, u<sup><</sup>, ə].
  - (3) /w/ in *know* has one variable which is not in *home*: [u<sup>˘</sup>].

We can sum up by saying that the pronunciation of the simple vocalic nucleus of /ay/ in *five* and *twice* shows almost all the same variations, however, that of the glide has apparent differentiation in the Atlantic States; and that of /ow/ in *home* and *know* shows that the former has more variables than the latter, however, their glides have similar variations. The variants of the complex vocalic nucleus /ay/ in *five* and *twice* are upgliding diphthongs throughout the Atlantic States, but exhibit very marked regional differences. In the Low Country /ay/ consistently has striking positional allophones, being articulated as [ɑ̄ ɪ] before consonants as in *five*, but [e ɪ] with a centralized starting position, before voiceless consonants as in *twice*. H. Kurath summarizes on the variations of /ay/ as in *five* as follows:<sup>4)</sup>

This diphthongal vowel varies regionally and positionally in four respects: (1) in initial quality, which may be low-front [a], low-central [ɑ], low-back [ɒ], or centralized [e, ə, ʌ]; (2) in the relative length of the initial element, which results in "slow" and "fast" diphthongs;

4) H. Kurath and I. R. McDavid, Jr. (1961) *op. cit.*, p. 109.

(3) in the distance, and hence the relative prominence, of the upglide (or inglide); and (4) in the presence or absence of marked positional variants.

The following tables I, II, III and IV (pp. 192-195) are the total combinations of the simple vocalic nuclei and the following glides and their distributions of /ay/ in *five* (I) and in *twice* (II), and /ow/ in *home* (III) and in *know* (IV) in the Atlantic States. The plus sign (+) denotes that there are/is the combination of the variations of the simple vocalic nucleus which is written at the left side of the table and the following glide which is written at the top of the table. The numerals under the + sign indicate the number of regions where the combination is current. The minus sign (-) shows that there is no combination of them in the Atlantic States.

Tables I-IV reveal evidence on the pronunciation of the Atlantic States as follows:

A. Variants of the simple vocalic nucleus and their combinations with the following glides of /ay/ in *five*:

[a, a<sup>></sup>, a<sup><</sup>, a<sup>></sup>, a<sup>^</sup>, ə<sup>v</sup>, ə<sup>]</sup> are followed only by [ɪ]

[a<sup>]</sup> is followed by [ɪ, ε, ε<sup>></sup>, ε<sup>^</sup>, ε, ə, ə<sup><</sup>, ə<sup>></sup>]

[a<sup>></sup>] is followed by [ɪ, I]

[a<sup>></sup>] is followed by [ɪ, ε, ε<sup>></sup>, ε, ə, ə<sup>]</sup>

[a<sup>></sup>] is followed by [ɪ, ə]

[a] is followed by [ɪ, e, ε, ε<sup>></sup>, ə]

[a<sup>]</sup> is followed by [ɪ, ε, ε<sup>^</sup>, ε]

[a<sup><</sup>] is followed by [ɪ, ε, ε<sup>]</sup>

B. Glides as the second unit of /ay/ and their combinations in *five*:

[ɪ] follows all the vowels of the first unit

[I] follows [a<sup>></sup>]

[ε] follows [a, a<sup>]</sup>, [a<sup><</sup>, a<sup>]</sup>, [a<sup>></sup>]

[ε<sup>^</sup>] follows [a<sup>]</sup>

[ε<sup>></sup>, ε<sup>^</sup>, ə<sup><</sup>, ə<sup>></sup>] follow [a<sup>]</sup>

Table I. /ay/ in *five*

Nucleus	Glide												Nos. of regions	
	[ɪ]	[ɪ̃]	[e]	[ɛ]	[ɛ^]	[ɛ>]	[ɛ̃^]	[ɛ̃^]	[ɛ]	[ə]	[ə̃]	[ə<]		[ə>]
[a]	-	+	-	-	-	-	-	-	-	-	-	-	-	9
[a']	-	+	-	+	-	-	+	+	+	-	+	+	+	17
[a>]	+	+	-	-	-	-	-	-	-	-	-	-	-	5
[a>']	-	+	-	+	-	+	-	-	+	+	+	-	-	16
[ã^]	-	+	-	-	-	-	-	-	-	-	-	-	-	2
[ã^']	-	+	-	-	-	-	-	-	-	+	-	-	-	2
[ɑ]	-	+	+	+	-	+	-	-	-	+	-	-	-	7
[ɑ']	-	+	-	+	+	-	-	-	+	-	-	-	-	6
[ɑ<]	-	+	-	-	-	-	-	-	-	-	-	-	-	1
[ɑ<']	-	+	-	+	-	-	-	-	+	-	-	-	-	3
[ɑ>]	-	+	-	-	-	-	-	-	-	-	-	-	-	1
[ɑ^]	-	+	-	-	-	-	-	-	-	-	-	-	-	1
[ə̃]	-	+	-	-	-	-	-	-	-	-	-	-	-	1
[e']	-	+	-	-	-	-	-	-	-	-	-	-	-	1
Nos. of regions	1	34	1	15	1	2	1	1	6	2	5	2	1	72

Table II. /ay/ in *twice*

Nucleus	Glide							Nos. of Regions
	[ɪ]	[ʏ]	[ɪʋ]	[ɨ]	[ɛ]	[ɛ̃]	[ɛ̃]	
[a]	+	+	-	-	+	-	-	20
[a']	-	+	-	-	-	-	+	2
[a>]	-	+	-	-	-	-	-	4
[a>']	-	-	-	-	-	+	-	1
[ã]	-	+	-	-	-	-	-	5
[a]	-	+	-	-	+	-	-	3
[a^]	-	+	-	-	-	-	-	3
[a<]	+	+	+	-	-	-	-	4
[ã]	-	+	-	-	-	-	-	1
[ə]	+	-	-	-	-	-	-	1
[əʋ]	+	-	-	-	-	-	-	1
[ə]	+	+	-	-	-	-	-	13
[əʋ]	-	+	-	+	-	-	-	8
No. of Regions	5	54	1	1	3	1	1	66

Table III. /ow/ in *home*

Nucleus	Glide							Nos. of Regions
	[v]	[v^]	[v̄]	[u]	[u<]	[ə]	[ø]	
[o]	+10	-	+6	-	-	-	+2	18
[o']	-	-	+1	-	-	-	+3	4
[o<]	+6	+1	-	-	-	-	+3	10
[o<']	-	-	-	+1	+1	-	+1	3
[oV]	+11	-	-	-	-	-	-	11
[oV']	+1	-	-	-	-	-	-	1
[øV]	-	-	-	-	-	-	+1	1
[oV̄]	+5	-	-	-	-	-	+1	6
[oλ̄]	-	-	+1	-	-	-	-	1
[oλ̄']	-	-	-	-	-	+4	+1	5
[oV̄']	-	-	-	-	-	-	+1	1
[o<']	+2	-	-	-	-	-	-	2
[θ]	-	-	-	-	+1	-	-	1
[θ>]	-	+1	-	-	-	-	-	1
[β]	-	+1	-	-	-	-	-	1
[β>]	+2	-	-	-	-	-	-	2
[βλ̄]	+1	-	-	-	-	-	-	1
[βλ̄']	+1	-	-	-	-	-	-	1
Nos. of Regions	39	3	8	1	2	4	13	70

Table IV. /ow/ in *know*

Nucleus	Glide					Nos. of Regions
	[ʊ]	[ʊ^]	[ʊ]	[u̇]	[ø]	
[o]	+14	-	+9	-	+4	27
[o<]	+6	-	-	+1	-	7
[o<']	+2	-	-	-	+1	3
[o^v]	+5	+1	+1	-	-	7
[o^<]	+1	-	+1	-	+2	4
[o^v̇]	+8	-	-	-	-	8
[o^v̇']	-	-	+1	-	-	1
[o^<']	+1	-	-	-	-	1
[β]	+1	-	-	-	-	1
[β>]	-	+1	-	-	-	1
[β^]	+1	-	-	-	-	1
[β^>]	+1	-	-	-	-	1
Nos. of Regions	40	2	12	1	7	62

[ɛ<sup>></sup>] follows [a<sup>></sup>, a]

[e] follows [a]

[ɛ̃] follows [a', a<sup>></sup>, a', a<sup><</sup>]

[ə] follows [a<sup>></sup>, a]

[ə̃] follows [a', a<sup>></sup>, a<sup>></sup>]

- C. Variants of the simple vocalic nucleus and their combinations with the following glides of /ay/ in *twice* :

[a] is followed by [ɪ, ɪ̃, ɛ]

[a'] is followed by [ɪ̃, ɛ̃<sup>></sup>]

[a<sup>></sup>, a<sup>></sup>, a<sup>^</sup>, a<sup><</sup>] are followed by [ɪ̃]

[a<sup>></sup>] is followed by [ɛ̃<sup>></sup>]

[a] is followed by [ɪ̃, ɛ]

[a<sup><</sup>] is followed by [ɪ, ɪ̃, ɪ̃<sup>v</sup>]

[ə, ə<sup>v</sup>] are followed by [ɪ]

[e] is followed by [ɪ, ɪ̃]

[e<sup>v</sup>] is followed by [ɪ̃, ɪ̃]

- D. Glides as the second unit of /ay/ and their combinations in *twice* :

[ɪ] follows [a, a<sup><</sup>, ə, ə<sup>v</sup>, e]

[ɪ̃] follows [a, a', a<sup>></sup>, a<sup>></sup>, a, a<sup>^</sup>, a<sup><</sup>, e, e<sup>v</sup>]

[ɪ̃<sup>v</sup>] follows [a<sup><</sup>]

[ɪ̃] follows [e<sup>v</sup>]

[ɛ] follows [a, a]

[ɛ̃<sup>></sup>] follows [a<sup>></sup>]

[ɛ̃<sup>></sup>] follows [a']

- E. Variants of the simple vocalic nucleus and their combinations with the following glides of /ow/ in *home* :

[o] is followed by [u, u, ø]

[o'] is followed by [u, ø]

[o<sup><</sup>] is followed by [u, u<sup>^</sup>, ø]

[ø<sup><</sup>] is followed by [u, u<sup><</sup>, ø]

[o<sup>v</sup>, o<sup>v</sup>, o<sup><</sup>, β<sup>></sup>, β<sup>></sup>, β<sup>^</sup>] are followed by [u]

[ø<sup>v</sup>, ø<sup>v</sup>] are followed by [ø]



- [o<sup>∇</sup>] is followed by [u, ø]  
 [o<sup>λ</sup>] is followed by [ʊ]  
 [o<sup>λ̄</sup>] is followed by [ə, ø]  
 [θ] is followed by [u<sup><</sup>]  
 [θ<sup>></sup>, β] are followed by [ʊ<sup>^</sup>]
- F. Glides as the second unit of /ow/ and their combinations in *home* :  
 [u] follows [o, o<sup><</sup>, o<sup>∇</sup>, o<sup>∇</sup>; o<sup>∇</sup>, o<sup><</sup>, β<sup>></sup>, β<sup>λ</sup>, β<sup>λ</sup>]  
 [ʊ<sup>^</sup>] follows [o<sup><</sup>, θ<sup>></sup>, β]  
 [ʊ] follows [o, o, o<sup>λ</sup>]  
 [u] follows [o<sup><</sup>]  
 [u<sup><</sup>] follows [o<sup><</sup>, θ]  
 [ə] follows [o<sup>λ̄</sup>]  
 [ø] follows [o, o, o<sup><</sup>, o<sup><</sup>, o<sup>∇</sup>, o<sup>∇</sup>, o<sup>λ̄</sup>, o<sup>λ̄</sup>]
- G. Variants of the simple vocalic nucleus and their combinations with the following glides of /ow/ in *know* :  
 [o] is followed by [u, ʊ, ø]  
 [o<sup><</sup>] is followed by [u, u<sup>∇</sup>]  
 [o<sup><</sup>] is followed by [u, ø]  
 [o<sup>∇</sup>] is followed by [u, ʊ<sup>^</sup>, ʊ]  
 [o<sup>λ</sup>] is followed by [u, ʊ, ø]  
 [o<sup>∇</sup>, o<sup>λ̄</sup>, β, β<sup>^</sup>, β<sup>λ</sup>] are followed by [ʊ]  
 [o<sup>∇</sup>] is followed by [ʊ]  
 [β<sup>></sup>] is followed by [ʊ<sup>^</sup>]
- H. Glides as the second unit of /ow/ and their combinations in *know* :  
 [u] follows [o, o<sup><</sup>, o<sup><</sup>, o<sup>∇</sup>, o<sup>λ̄</sup>, o<sup>λ̄</sup>, o<sup>λ̄</sup>, β, β<sup>^</sup>, β<sup>λ</sup>]  
 [ʊ<sup>^</sup>] follows [o<sup>∇</sup>, β<sup>></sup>]  
 [ʊ] follows [o, o<sup>∇</sup>, o<sup>λ̄</sup>, o<sup>λ̄</sup>]  
 [u<sup>∇</sup>] follows [o<sup><</sup>]  
 [ø] follows [o, o<sup><</sup>, o<sup>λ̄</sup>]

By the tables I and II, we can figure out that one of the variants of /ay/ in *five* and *twice* begins low-front and the tongue glides up to a high

position: [a ɪ] which was used nine regions as in *five* and eighteen regions as in *twice*. In the table II, we find two rare variants of /ay/: [ɐ ɪ] and [ɐ<sup>v</sup> ɪ], which Kurath denotes as 'older pronunciations'<sup>5)</sup>, with a raised lowcentral beginning and a swift up-glide.

Since the numerals which are written under the + sign in tables I-IV indicate the number of regions where the combinations were current at the time the field work was done, table I shows that [a<sup>></sup>] and [a<sup>></sup>] were the most widely used pronunciations of the first unit of the complex vocalic nucleus /ay/ in *five* in the Atlantic States, because the former had eight different kinds of combinations with glides [ɪ, ɛ, ɛ<sup>></sup>, ɛ<sup><</sup>, ɛ, ə, ə<sup><</sup>, ə<sup>></sup>] and they were used in seventeen different regions and latter had six different kinds of combinations with the glides [ɪ, ɛ, ɛ<sup>></sup>, ɛ, ə, ə] and they were used in sixteen different regions. The least widely used vowels were [a<sup><</sup>, a<sup>></sup>, a<sup><</sup>, ə<sup>v</sup>, ɐ<sup>v</sup>], because each vowel had only one combination with a glide [ɪ] and was used in only one region in the Atlantic States. The most widely spread pronunciation of a glide as the second unit of the complex vocalic nucleus /ay/ was [ɪ], because it follows all the fourteen vowels of the first unit and combinations were used in the thirty-four different regions in the Atlantic States. The next most widely used pronunciation of a glide as the second unit was [ɛ], since it follows five vowels [a<sup>></sup>, a<sup>></sup>, a, a<sup><</sup>, a<sup><</sup>] and each combination was used in fifteen different regions.

Table II shows that [a] was the most widely spread phonetic variation of the first unit of the complex vocalic nucleus /ay/ in *twice*, because it had three different combinations with glides [ɪ, ɪ, ɛ] and they were used in twenty regions. The least widely used vowels as the first unit were [a<sup>></sup>, a<sup><</sup>, ə, ə<sup>v</sup>], because each vowel had only one combination with a glide [ɛ<sup>></sup>, ɪ, ɪ, ɪ] respectively and each combination was used in only one region in the Atlantic States. The most widely spread pronunciation of a glide as the second unit was [ɪ], because it follows ten vowels and the combinations were used in fifty-four regions. The least widely spread

5) Hans Kurath, Bernard Block, *et al.* (1939, 2nd edition 1973) *op. cit.*, p. 4.

pronunciations of glides were [ɪv, ɪ̄, ē<, ē>], as each variety had one combination with the first unit vowels [ɑ<, ēv, a>] respectively and each combination was used in only one region in the Atlantic States.

From table III and IV we can figure out that the complex vocalic nucleus /ow/ in *home* and *know* had a special characteristic which was not in /ay/ in *five* and *twice*. That was [ø], which means that there was no pronunciation of a glide, in other words, the complex vocalic nucleus consisted of only the first unit, that is the simple vocalic nucleus. So /ow/ as in *home* and *know* is a phonemically complex vocalic nucleus, however, phonetically it was a simple vocalic nucleus in some regions.

From table III we can learn many things. [o], [o<] and [o<sup>v</sup>] were the most widely used pronunciation as the first unit of the complex vocalic nucleus /ow/ in *home* in the Atlantic States, because [o] had three different combinations with glides [u, u, ø] and they were used in eighteen different regions, [o<] had also three different combinations with glides [u, u<sup>^</sup>, ø] and they were used in ten different regions and though [o<sup>v</sup>] had only one combination with a glide [u], it was used in ten different regions. The least widely used vowels were [o<sup>v</sup>, ø<sup>v</sup>, o<sup><</sup>, o<sup><</sup>, θ, θ>, β, β>, β<sup>></sup>, β<sup>></sup>], because each vowel had only one combination with a glide and was used in one region respectively. The most widely spread pronunciation of a glide as the second unit of the complex vocalic nucleus /ow/ in *home* was [u], because it followed nine vowels [o, o<, o<sup>v</sup>, o<sup>v</sup>, o<sup><</sup>, o<, β<, β<sup>></sup>, β<sup>></sup>] and the combinations were used in thirty-nine regions. The least widely spread pronunciation of a glide was [u], since it had one combination with [o<] and was used in one region in the Atlantic States.

Table IV shows that [o] is the most widely spread phonetic variation as the first unit of the complex vocalic nucleus /ow/ in *know*, because it has three different combinations with glides [u, u, ø] and it was used in twenty-seven different regions. The least widely used vowels as the first unit were [o<sup><</sup>, o<sup><</sup>, β, β>, β<sup>></sup>, β<sup>></sup>], because each vowel had only one combination with a glide and each combination was used in only one region in the Atlantic States. The most widely spread pronunciation of a glide as

the second unit was [ʊ], because it follows ten vowels and the combinations were used in the forty regions. The least widely spread variant of a glide was [u̯], as it had one combination with the first unit and it was used in only one region.

Finally, the dialects tend to disappear due to the development of television, radio, movies and other mass media as H. Kurath says 'Many features of folk speech are rapidly disappearing in New England; some are nearly extinct and many others have been entirely abandoned. The rural northern states, especially New Hampshire and Maine, have preserved local dialect features much more extensively than the industrialized southern section. . .'<sup>6</sup> It would be very important to undertake field work periodically, for instance fifty or a hundred years later, just the same way which H. Kurath and other dialectologists did in 1930s and 1940s to find which variants are extinct and which are preserved in which regions.

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6) Hans Kurath, Bernard Block, *et al.* (1939, 2nd edition 1973) *op. cit.*, p. 4.